M 40310

WESTON®

FREQUENCY COUNTER

Model 1250

INSTRUCTIONS / PARTS LIST

INSTRUCTIONS WITH PARTS LIST

for

WESTON®

MODEL 1250

FREQUENCY COUNTER

Copyright 1971 by

WESTON INSTRUMENTS, INC.
614 FRELINGHUYSEN AVENUE, NEWARK, N. J. 07114
a Schlumberger company

F-3717

Printed in U.S.A.

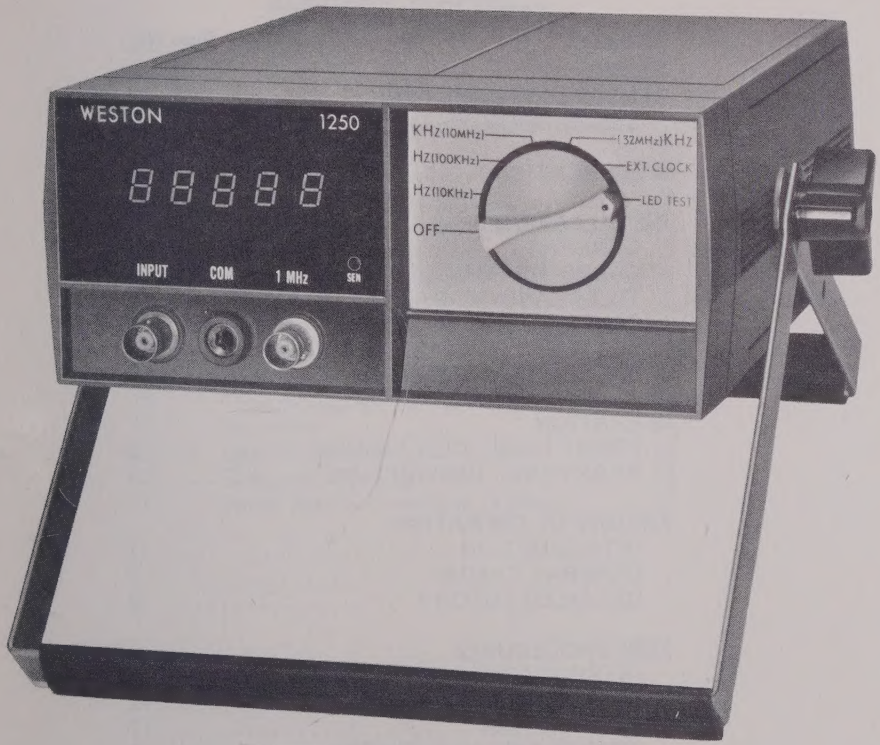

Figure 1. Model 1250 Frequency Counter with Handle/Stand

TABLE OF CONTENTS

Section	Page No.
GENERAL INFORMATION	1
DESCRIPTION	1
SPECIFICATIONS	1
INSTALLATION	
GENERAL	2
CARRYING HANDLES	2
TILT-STAND OPERATION	3
PANEL MOUNTING	3
BATTERY PACK OPTION	5
POWER REQUIREMENTS	5
OPERATION	
FRONT PANEL DESCRIPTION	5
REAR PANEL DESCRIPTION	6
THEORY OF OPERATION	
INTRODUCTION	7
GENERAL THEORY	7
DETAILED THEORY	8
TEST PROCEDURES	
INTRODUCTION	12
TEST EQUIPMENT	12
CALIBRATION	12
SENSITIVITY ADJUSTMENT	12
POWER SUPPLY	13
SCHEMATIC DIAGRAMS AND ASSEMBLY DRAWINGS	13
PARTS LIST	18

LIST OF ILLUSTRATIONS

Figure		Page No.
1	Model 1250 Frequency Counter with Handle/Stand	i
2	Handle/Stand Assembly	2
3	Panel Cut-Out Dimensions	3
4	Removal of Front Assembly Using Handle/Stand as Fulcrum	3
5	Panel Mounting (Optional)	4
6	Front Panel Description	5
7	Rear Panel Description	6
8	Block Diagram	7
9	Gate and Reset Circuit	10
10	Timing Diagram 10KHz Range	11
11	Assembly	14
12	Board Assembly	15
13	Schematic Drawing	16
14	Power Supply Schematic Drawing	17

GENERAL INFORMATION

DESCRIPTION

The Weston Model 1250 is a compact, solid state digital frequency counter. It measures frequencies to greater than 32MHz. The instrument measures frequency or repetition rates of input signals by totalizing the events during sample periods of 1 millisecond, 10 milliseconds, 1 second and 10 seconds.

The readout for the instrument consists of five 7-segment LED (light emitting diodes) displays. A single function switch is used for operation. Because of the automatic input trigger circuit, the conventional input attenuator switch has been eliminated. At input levels greater than 500mV, the Model 1250 may impose excessive loads on the circuit under measurement unless limited by a suitable attenuator. For additional details, refer to Input Amplifier under DETAILED THEORY. The function switch selects the counter gate times of 1 MS, 10 MS, 1 S and 10 seconds, the external clock position and the LED SEGMENT test.

The gate periods are derived by dividing down the internal 1MHz crystal controlled oscillator. The 1MHz oscillator output is accessible through the 1MHz output connector on the front of the instrument.

With the function switch in the external clock position, the 1MHz output connector is used to apply an external 1MHz clock signal to the instrument. When an external 1MHz clock is used, the Model 1250 reads directly to 32MHz (32,000KHz).

The mechanical design of Model 1250 has stressed operator convenience and confidence in its straight - forward control/connector layout. Easy portability is evident, too, in its small size, and its battery pack compatibility for field use.

Carrying handles serve a dual purpose as a tilt-stand for any viewing angle during table top operation. The instrument may be panel mounted without any additional parts.

Optional accessories include a battery pack capable of over 2 hours of continuous field operation and overnight recharge, and a leather carrying case.

Power requirements are 115V AC or 230V AC at frequencies of 50/60/400Hz.

SPECIFICATIONS

Display:	Maximum Count: 99999 Overrange Indication: Automatic All decimal points luminate except on 32MHz range
Power Requirements	115VAC or 230VAC Tolerance: +15%, −10% Line Frequency: 50Hz to 400Hz Power Drain: 11 watts, nominal
Accessories	Combination carrying handle tilt stand - standard Battery Pack, Catalog No. 9740-270520 - optional Battery, Catalog No. 9740 - 2701045 - optional Leather Carrying Case, Catalog No. 9740-0269562 - optional

Additional
Features . . . . . Power fuse accessible from outside of unit.
External 1MHz clock input (on 10MHz range). The LED display, utilizes ripple blanking of the most significant decade. MSD blanking improves readability by inhibiting zeroes to the left of the displayed frequency.

Temperature
Operating . . . . . $10^{o}C$ to $40^{o}C$

Frequency:
Range . . . . . 5Hz to greater than 32MHz
Accuracy . . . . . $\pm$1 count $\pm$time base stability
Gate Periods . . . . 1 millisecond, 10 milliseconds, 1 second and 10 seconds.

External Time Base . 1MHz (on 10 millisecond range) $T^{2}L$ compatible

Time Base:
Frequency . . . . . 1MHz crystal controlled $\pm$2Hz
Aging Rate . . . . Less than 1 PPM/month after 30 days.
Temp. Coef. . . $\pm$10 PPM $10^{o}C$ to $40^{o}C$, reference $25^{o}C$ after 30 minute warm up.

Input
Characteristics:
Sensitivity . . . . . 250mV RMS
Trigger Level . . . Automatic
Impedance . . . . 1MΩ shunted by less than 30 pF
Maximum
input . . . . . 50V RMS (max. DC is $\pm$50 volts)

Size . . . . . 3" high x 7" wide x 7.9" deep

Weight . . . . . 4 pounds (1.9 kg) approx.

INSTALLATION

GENERAL

Inspect the instrument for possible damage in shipment. If damage is noted, notify the carrier and supplier before using the instrument.

CARRYING HANDLES

Remove the carrying handles and knobs from the accessory container. Mount handles to the case as shown in Figure 2. The knobs differ at their threaded ends and may be used on either side of the case. To orient the handles for carrying, rotate both handles to the front of the case. The detents will lock and can be secured by tightening the knobs.

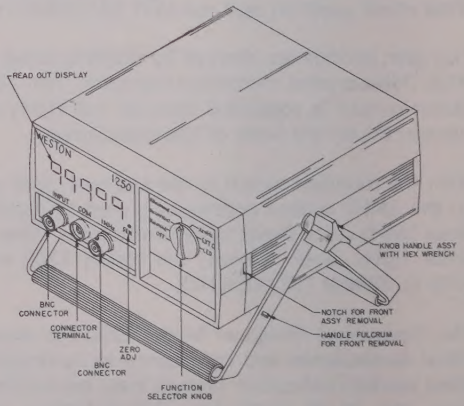

Figure 2. Handle/Stand Assembly

TILT-STAND OPERATION

For bench or table top use, lock the handles in the open position as shown in Figure 2. Two stable orientations of the handles are possible, each providing a different height off the table. In one position, the inner handle is forward; in the second, it is to the rear.

It is important to engage the handle detents when in the tilt-stand position in order to provide maximum stability.

PANEL MOUNTING

The instrument is provided with an option for mounting on a 1/8 inch panel. Special mounting screws are provided in the instrument and the panel cut-out dimensions are given in Figure 3.

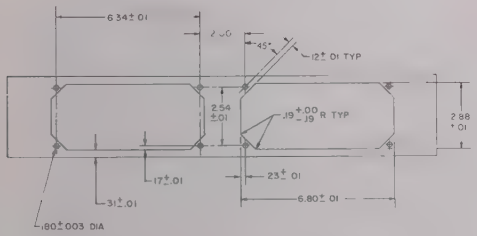

Figure 3. Panel Cut-Out Dimensions

To mount the instrument on a prepared panel, reposition the circuit board 1/8 inch forward inside the case. To perform this modification, follow the step-by-step instructions carefully to prevent damage to the instrument. (See Figures 4 and 5.)

1. Stand case on back end with inner handle locked in the front position as shown in Figure 4.

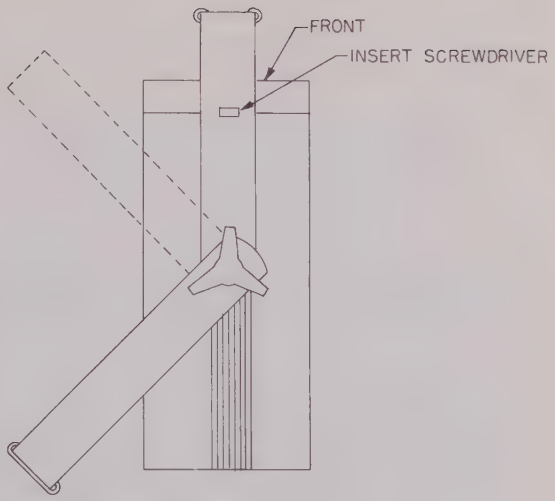

Figure 4. Removal of Front Assembly Using Handle/Stand as Fulcrum.

2. The front may now be removed. Starting on one side, insert 1/8 inch screwdriver blade through rectangular hole provided in inner handle and into notch in front. Using handle as a fulcrum, gently pry front upwards. It will snap into a new position, 1/8 inch forward. Repeat on other side. Now reset screwdriver blade 1/16 inch lower on front to engage edge of front. Pry up front one more notch on each side. The front will now come free.

3. Before pulling off front, swing handle clear of front and reset in table top position.

4. Facing the instrument's front, gently pull front upward. Switch shaft may come out with front. Lay front down on table.

5. Remove shaft from front and replace it in rotary switch assembly.

6. Leads may now be removed from front and front put aside temporarily. Note the interconnections to reconnect correctly.

7. The handles may now be removed.

8. To remove circuit board, rotate two screws at rear of case 1/2 turn counterclockwise. This will rotate two clamps freeing circuit board from case. (See Figure 5.) Remove edge connector guard.

9. Grasp circuit board from front of case and remove. This can be assisted by pushing on rear of circuit board at edge of accessory connector.

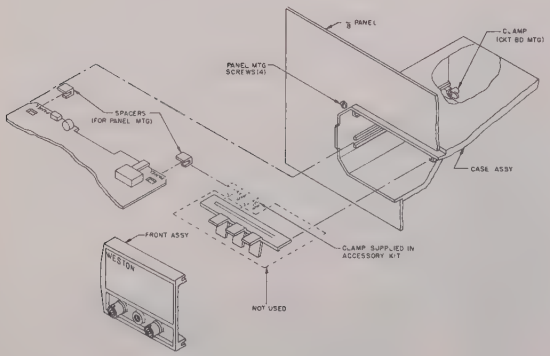

Figure 5. Panel Mounting (Optional)

10. The board must be advanced 1/8 inch forward in case to allow for panel mounting clearance. One-eighth inch spacers are provided with instrument accessory kit.

11. Slip spacers onto rear of circuit board behind rectangular cutouts in space marked PANEL. Orient spacers with cutout side down. Secure them in place with a small amount of cement such as pliobond. When properly positioned, the word PANEL will not be visible.

12. Advance circuit board mounting clamps by 1/8 inch to engage the new positions of cutout. Rotate clamp screws at rear counterclockwise approximately 6 turns until both clamps can be rotated past the stops built into case.

13. Insert circuit board into case making sure that clamps can slide into cutouts on circuit board in this new position.

14. Slide circuit board all the way back into case and secure by rotating screw clamps. Replace edge connector guard.

15. The case may now be mounted into prepared panel by means of screws and inserts provided at front of case.

16. Connect leads to front assembly.

17. Install front panel on case. Observe that notch in range knob lines up with spline on switch shaft.

BATTERY PACK OPTION

The instructions for mounting the battery pack accessory are provided with the battery pack. Interconnection will be made through the accessory connector at the rear of the case. When operated without a battery pack, the accessory connector must be protected to prevent accidental contact with lethal voltages. A guard has been provided for this purpose and must be kept on the instrument.

POWER REQUIREMENTS

The Weston Model 1250 has been designed to operate on 115VAC or 230VAC, 50Hz to 400Hz. A rear panel switch permits operation in either voltage mode. Be sure that the switch is in the proper position for the local power lines before applying power. If 115 VAC is applied in the 230VAC position, only a faint display will occur. If 230VAC is applied in the 115VAC position, a rear panel fuse will blow out. The line voltage ratings of this instrument will permit it to extend to 15% above or 10% below nominal line voltage.

The Model 1250 is equipped with a three conductor power cable that grounds the instrument when plugged into a suitable outlet. To preserve this feature when operating with a two contact outlet, use an adapter and connect the pigtail on the adapter to a suitable earth ground. (See Figure 7, rear panel description for further details.)

OPERATION

FRONT PANEL DESCRIPTION

1. Function Switch. Applies AC power to instrument. Power is applied for all indexed positions except off and any unmarked positions. There is no stop on function switch.

2. Input frequency BNC connector 5Hz to 32MHz. The common jack located on the front panel (center jack) is the same as shield on input cable.

3. 1MHz Output BNC Connector. The 1MHz appears at this jack on all positions of the function switch except off and external clock. When the function switch is indexed to the external clock position, the 1MHz output jack is utilized to apply the 1MHz external signal into the instrument. The 1MHz external clock signal must be compatible with T^2L logic. When the instrument is indexed to the external clock position, the instrument is in the 10 millisecond time base position; 32MHz (32,000KHz).

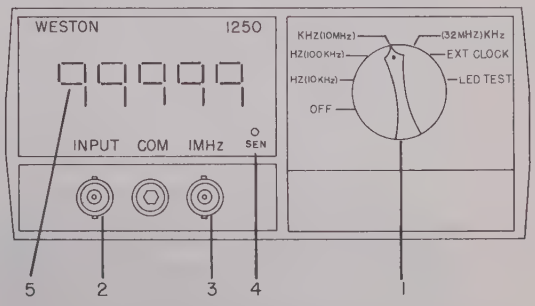

Figure 6. Front Panel Description

4. Sensitivity adjustment.

5. Display

   a. Five LED displays with decimal point. Decimal point is automatically determined by function switch

   b. Stored display on the 32MHz, 10MHz and 100KHz ranges. On the 10KHz range the storage is disabled and the display will count following counters.

   c. Overrange is indicated on all ranges except the 32MHz range by lighting all decimal points. There is no overrange indication on the 32MHz range.

   d. The LED display utilized ripple blanking of the most significant decades. When a logic "0" is applied to the blanking input all segment outputs go to a Logic 1 state, blanking display. MSD blanking improves readability by inhibiting zeroes to the left of the displayed frequency.

REAR PANEL DESCRIPTION

1. Line Voltage Selector Switch is a two position slide switch. Left position is for 115 volt power line operation. Right position is for 230 volt power line operation.

2. AC Power Line Connector is a three pin recessed male connector. The right hand pin supports a 1/4A 8AG fuse. It is removed with the aid of a small wrench designed into the top of the tilt-stand knob handle.

3. Accessory Connector is provided to accommodate the accessory battery pack, it should remain protected by the insulated cap provided with the instrument.

4. Adjustments, 1MHz crystal C19, 5V VCC to digital logic R44.

5. Screw Clamps used for securing circuit board.

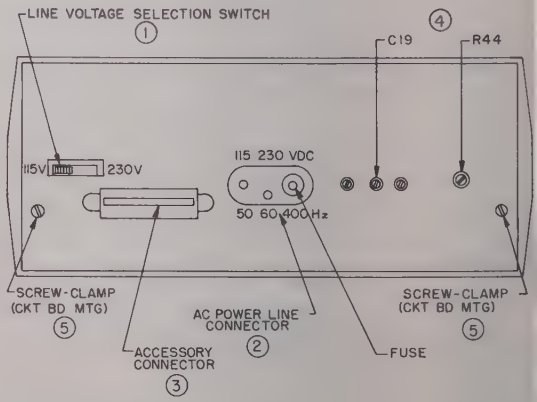

Figure 7. Rear Panel Description

THEORY OF OPERATION

INTRODUCTION

This section presents the operating principles of the Weston Model 1250 Frequency Counter. The theory is first presented at the functional level followed by a detailed description.

GENERAL THEORY

The circuit operation will be explained with the aid of the block diagram Figure 8.

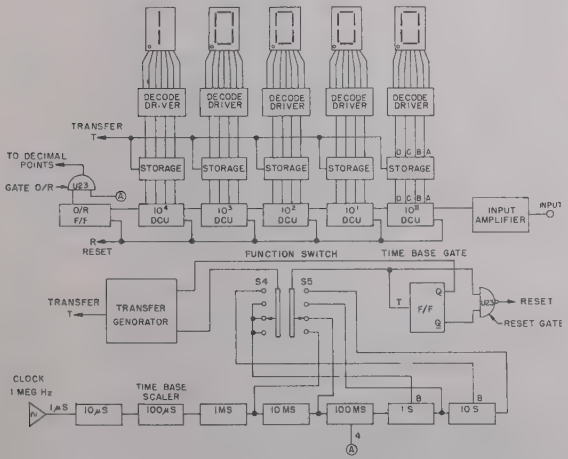

Figure 8. Block Diagram

The Frequency Counter consists of: input amplifier with automatic trigger level, decade count units (DCU) with storage and decoder driver circuits, 1MHz time base oscillator, time base scaler, gate, reset and transfer circuits.

Inputs from 5Hz to 32MHz are accepted and shaped by the input amplifier and coupled as count pulses to the decade counting units. The count chain is gated on and off by the time base gate flip-flop in four gate modes, 1 millisecond, 10 milliseconds, 1 second and 10 second intervals as indexed by the function switch. Stored display is featured with up dating of the visual display by the transfer circuits at 1 second intervals for the 1 millisecond and 10 millisecond range (32MHz and 10MHz), 2 second intervals for the 1 second range (100KHz) and 20 second intervals for the 10 second range (10KHz) as indexed by the function switch.

The function switch selects the proper time base by coupling the output of the time base scaler to the time base gate flip-flop. The 1MHz reference clock is divided down by the time base scaler, providing the 1 millisecond, 10 milliseconds, 1 second and 10 second triggers to the time base gate flip-flop (T.B. gate F—F). These triggers set and reset T.B. gate F—F. The T.B. gate F-F is coupled to the DCUs and gate the DCUs ON and OFF

Reset and transfer pulses are also produced by the gate circuits. During gate off time a reset pulse is generated resetting the DCUs to zero. During gate on time the DCUs are accumulating the pulses from the input amplifier. At the end of the gate on time, a transfer

pulse is generated. This signal transfers the accumulated count in the DCUs to the LED displays through the decode drivers.

In the 32MHz and 10MHz position, 1 second transfer pulses are generated in the 100KHz position, 2 second transfer pulses are generated in the 10KHz position, the storage units are locked up allowing the display to follow the DCUs. In the 10KHz position, the display will follow the DCUs for 10 seconds, stop and display the information for 8 seconds, then reset to zero conditioning the DCUs to accept the next 10 second sample.

DETAILED THEORY

Input Amplifier

The input circuits consist of an FET input amplifier and follower circuit, (Q6 and Q7), emitter compensated amplifier Q8, buffer amplifier Q9, Schmidt trigger Q10 and Q11 and emitter follower buffer amplifier Q12.

The input impedance of the instrument is 1 megohm shunted by less than 30pF at input signal greater than 250mV and less than 500mV RMS. The input impedance at signal levels greater than 500mV is reduced. The reduction of impedance is due to the automatic trigger level network at the input amplifier. When measuring a signal from a high impedance source greater than 500mV RMS. Caution should be observed in noting that the input of the Model 1250 does not present an excessive load to the signal source.

The effect of input loading of the signal source can be eliminated by placing a resistor in series between the source and the input of the instrument or by an appropriate resistive divider at the output of the source.

Input frequencies from 5Hz to greater than 32MHz with a dynamic sensitivity range of 250mV to 50V RMS are accepted, amplified, shaped and coupled to the DCUs.

Decade Count Units

The count chain consist of five cascaded DCUs with related buffer storage and decode driver stages. Input signals from Q12 are accumulated in the count chain, when the chain is gated ON. Each decade stage couples four line binary information to their respective buffer storage circuits.
Inputs are accumulated for the gate ON time (1 MS, 10 MS, 1 S or 10 S) then at 1 second or 2 second intervals, the accumulated count is transferred from the count chain to the buffer storage circuits. This transfer is produced by the transfer signal. The buffer storage stage drives the decode driver. Here the four line BCD is decoded to seven lines to drive the LED displays.

The transfer signal is generated in three modes of operation: 32MHz, 10MHz and 100KHz. In the 10KHz mode of operation, the storage units are disabled and the decode drivers are allowed to follow the DCUs.

The decode drivers accept the four line BCD information and decodes this information to drive a seven segment LED display. The driver circuits incorporate automatic ripple zero blanking control. When a logic zero is applied to the blanking inputs all segment outputs go to logic 1 blanking out the display.

Operation of each decade is identical in that input signals are counted, the count is transferred and read-out, etc. The least significant digit is driven at rates that could exceed 32MHz, therefore, its design is different than the succeeding decades.

The units (10^0) decade DCU is comprised of a high speed binary and a standard DCU. The standard DCU 7490 is comprised of a binary stage (÷ 2) and quinary stage (÷ 5). To allow for faster counting, the output of Q12 is applied to the 74H73 J–K flip-flop. By proper wiring, the binary stage of the 7490 is replaced with a high speed binary 74H73, allowing the units decade DCU to accept an input frequency signal greater than 32MHz. Counting is gated ON when the J–K inputs are taken to logic 1 and inhibited when J–K inputs are taken to logic O.

The 10^1 through 10^4 DCUs employ 7490 and 74L90 integrated circuits. These are decade counters providing one output for 10 input pulses. The four line 8–4–2–1 BCD output is coupled to the buffer storage stages which drive the seven segment decode driver which control the LED displays.

Buffer Storage

Four buffer storage stage couples the four line BCD information to the decode drivers. The buffer stages are comprised of two types of latches, 93L08 which consist of two four line latches and a 7475 single four line latch.

Decoder Driver

The decoder driver employed is the 7446. The decoder driver decodes or converts the four line BCD information to seven line output and applied to the LED displays.

Overrange Detection and Readout

When the count exceeds 99,999, a negative going pulse at D output of U9 (74L90) toggles the overrange flip-flop U14 (7473). When toggled the Q output of U14 goes to logic 1 the $\overline{Q}$ output of U14 controls the J–K inputs of U14 locking the flip-flop Q output in the logic 1 state. The overrange flip-flop will remain in this state until the reset pulse clears the O/R F–F. When the Q output of U14 goes to logic 1 state, Q5 is enabled allowing all decimal points to be luminated All decimal points ON is the overrange condition. Overrange can occur on all frequency ranges except the 32MHz range.

Time Base and Scaler

The time base is comprised of a 1MHz crystal oscillator and seven cascades 74L90 decade divider integrated circuits. Each decade divides its input by ten. The 1MHz crystal oscillator provides the reference drive signal to the scaler. The four gate times are produced by the scaler as set by the function switch. The storage transfer timing is also produced by the scaler. In the 32MHz and 10MHz position of the range switch, the transfer pulse is produced 1 per second. In the 100KHz position the transfer pulse is produced every two seconds. In the 10KHz position, the transfer function is enabled, allowing the display to follow the counters.

Gate and Reset

This discussion assumes the function switch is in the 100KHz position, Figure 9.

The time base scaler, output selected by the function switch, is connected to the toggle input of (U14) the time base gate flip-flop, which times the DCU gating, reset and the transfer functions. The Q and $\overline{Q}$ outputs of U14 produce a square wave with a 1 second pulse width. The 1 second (Logic 1) pulse from U14 Q output enables the counter ON for precisely 1 second. The Q output is connected to the reset control gate. The reset counter gate requires two Logic 1 states to generate a reset pulse, therefore, the reset pulse can only be generated when $\overline{Q}$ is in the Logic 1 state. At which time the units DCU is inhibited. Coincidence of the time base Logic 1 and $\overline{Q}$ Logic 1 is once every two seconds, A and C, Figure 10; producing reset pulses D and E.

Transfer

In the 100KHz position function switch, Figures 8 and 9, the time base scaler output is selected by the function switch. The transfer signal is inverted (U23) and differentiated by C18 and R60 to from a 30μ second pulse. This pulse is used to set the transfer flip-flop H, Figure 10, when set, the transfer flip-flop remains in this condition Q to Logic O until toggled by the time base gate flip-flop. When the transfer flip-flop is toggled, the Q output pulse is differentiated by C16 and R61 to form a 10 microsecond pulse, J Figure 10, this pulse is shaped and inverted by U23 and U22 to generate the proper pulse to update the 93L08 and 7475 which transfers the DCU 74L90 BCD information to the 7446 decode driver driving the LED displays, K and L. Due to propagation delay of the logic circuits, differentiator C16 and R61 10 microsecond delay is needed to prevent the transfer from being generated, before the DCUs stop counting after being inhibited.

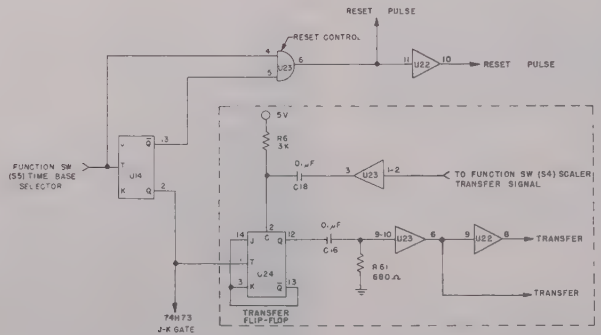

Figure 9. Gate and Reset Circuit

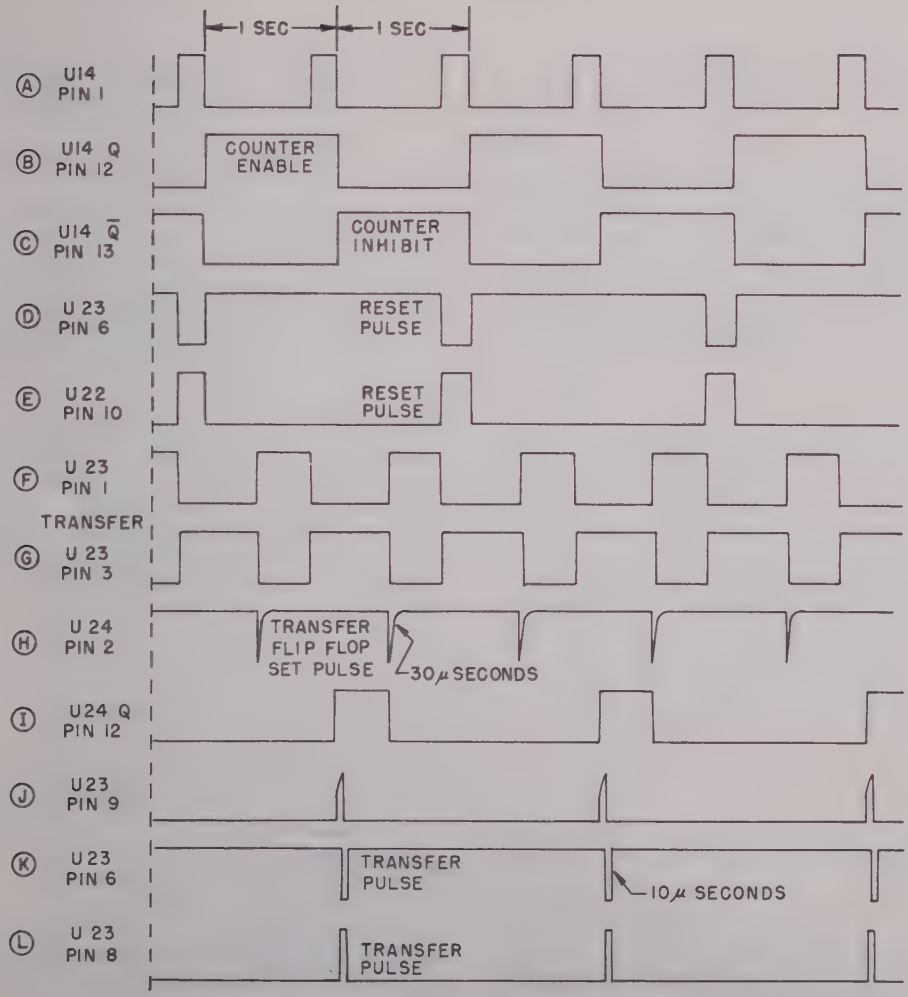

Figure 10. Timing Diagram 10KHz Range

TEST PROCEDURES

INTRODUCTION

This section contains calibration procedures for the Frequency Counter. As in the case with any electronic equipment, periodic confidence testing and calibration of the instrument should be performed.

The following calibration procedure is outlined to provide a complete check of the Frequency Counter. Prior to calibration, allow instrument to warm up for one half hour.

TEST EQUIPMENT

The following is a list of test equipment recommended for testing the Frequency Counter.

1. Oscilloscope - Tektronic Model 535
2. Audio Oscillator - Hewlett-Packard Model HP202C
3. RF Signal Generator (to 25MHz with 250mV RMS output - Hewlett-Packard Model HP606A)
4. 1MHz Frequency Standard - Frequency standard of 1 part in 10^7 to calibrate 1MHz oscillator
5. Digital Multimeter - Weston Model 1240

CALIBRATION

Power Supply

1. Apply 115V, 50 to 400Hz to Frequency Counter.
2. Voltage should be 5 volts DC $\pm$ 1% betwen pin 9 of accessory connector (Ref Fig. 7) and COMM jack (Ref Fig. 6).
3. If not, adjust variable resistor R44 (Ref Fig. 7) until voltage is within specified limits.

Time Base

1. Set FUNCTION switch to 100KHz position.
2. Connect oscilloscope to 1MHz output connector and observe signal.
3. Signal should be 1MHz between 2.4 and 5 volts peak to peak.
4. Remove oscilloscope from 1MHz output connector.
5. Connect 32MHz frequency standard to 1MHz output connector.
6. Frequency standard should read 1MHz $\pm$ 2Hz.
7. If not, adjust variable capacitor C19 (Ref Fig. 7) until frequency is within specified limits.

Input Amplifier

The input amplifier should accept inputs from 5Hz to greater than 32MHz within specified sensitivity. With a signal generator set at 250mV RMS (using frequency standard as monitor) vary the input frequency 5Hz to greater than 32MHz and observe the Model 1250 display. The display should indicate the applied frequency $\pm$ 1 count throughout the frequency ranges.

SENSITIVITY ADJUSTMENT

Input Amplifier Adjustment Procedure

1. Apply 32MHz 1 volt RMS with a signal generator to INPUT of Frequency Counter. Observe that proper triggering takes place.
2. Decrease input signal until display becomes unstable.
3. Adjust SENSITIVITY control, on front panel, slightly in either direction until display becomes stable.
4. Continue this converging procedure of reducing input and readjusting sensitivity control until optimum low signal level is reached.

5. Using this method, inputs from 5Hz to greater than 32MHz equal to or greater than 250mV will trigger the Frequency Counter.

POWER SUPPLY

The power supply circuits for the Frequency Counter provide a 15 volts DC regulated source for the input amplifier circuitry, a regulated 5 volt Vcc source for the digital circuits and a full wave rectification capacitive filter unregulated 5 volt DC source for the LED displays.

Two nominal line voltage levels of 115V and 230V have been accommodated by a switch changing the primary winding connections from parallel to series aiding.

A supplementary winding has been added to the transformer to provide energy for recharging a battery pack accessory, and to serve as part of the DC to AC converter, provided with the battery pack. By making the converter winding part of the power transformer, converted battery power automatically replaces AC line power. A schematic diagram of the power supply will be found in Figure 14.

SCHEMATIC DIAGRAMS AND ASSEMBLY DRAWINGS

This section contains the Schematic Diagrams and Assembly Drawings for the Weston Model 1250 Frequency Meter. Reference symbols will be found on the schematic Diagrams and Board Assembly. Item numbers will be found on the assembly drawings.

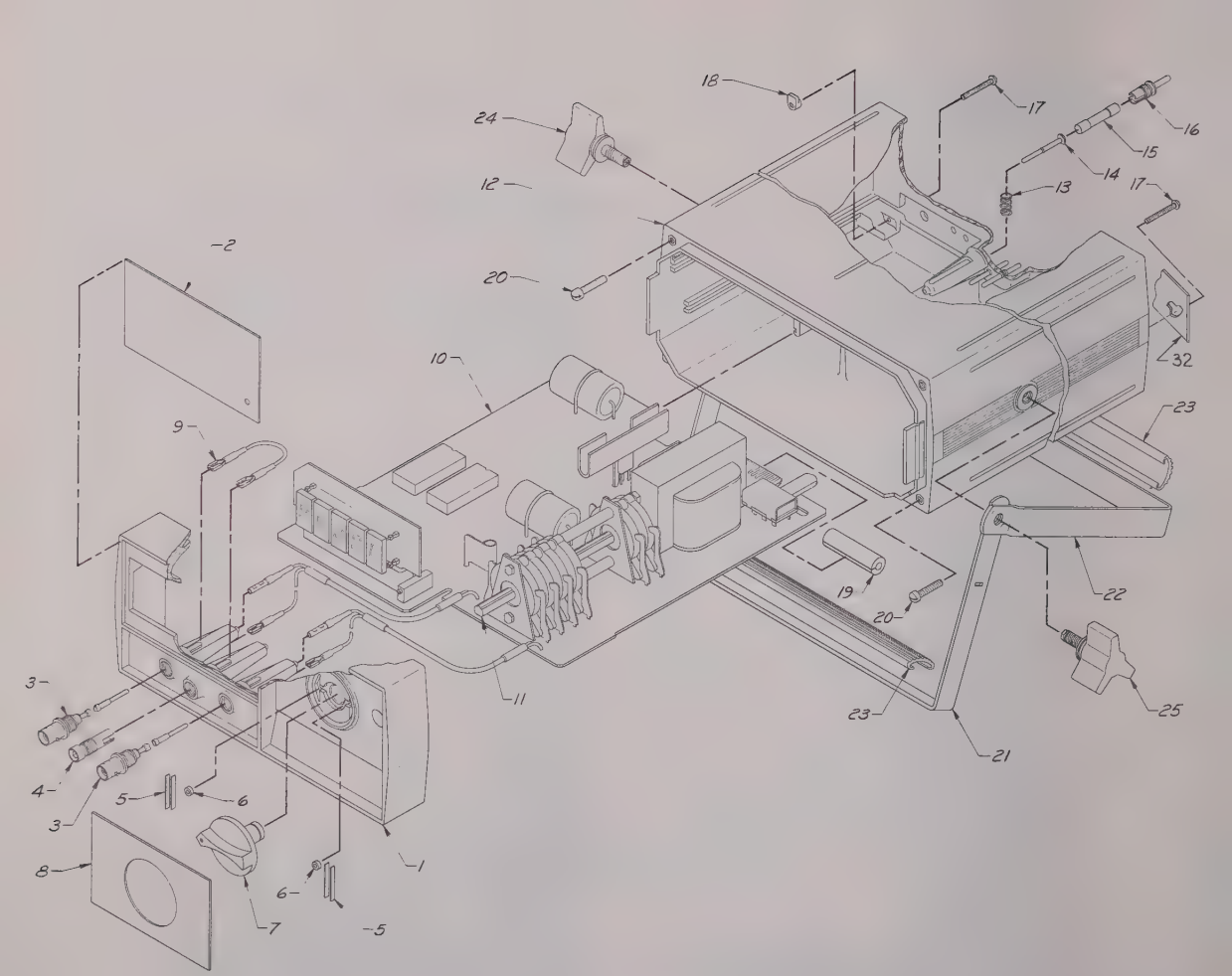

Figure 11. Assembly

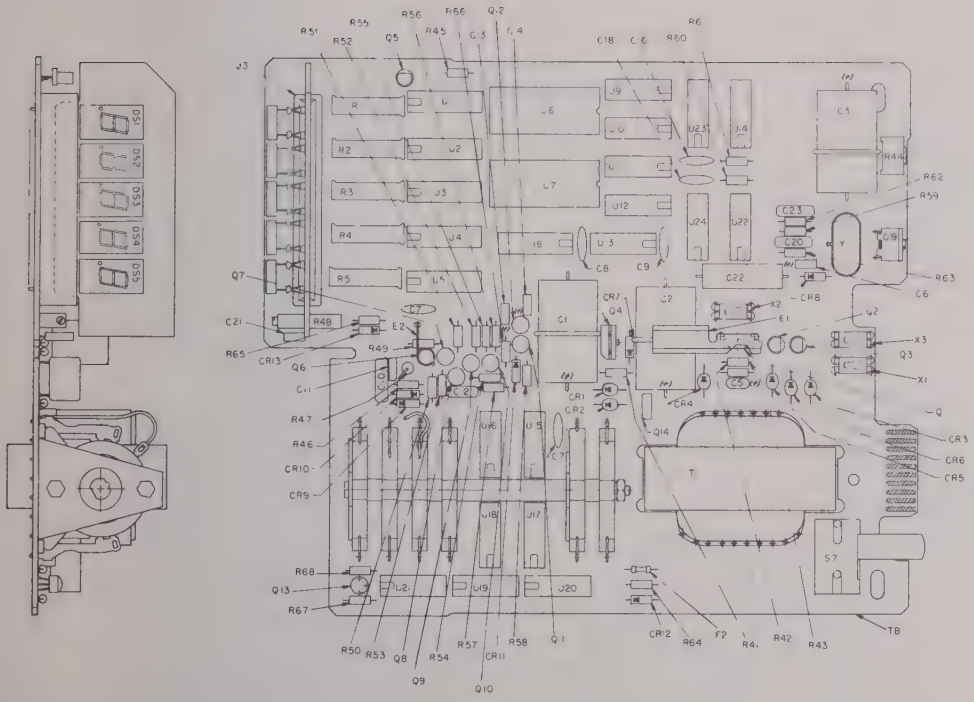

Figure 12. Board Assembly

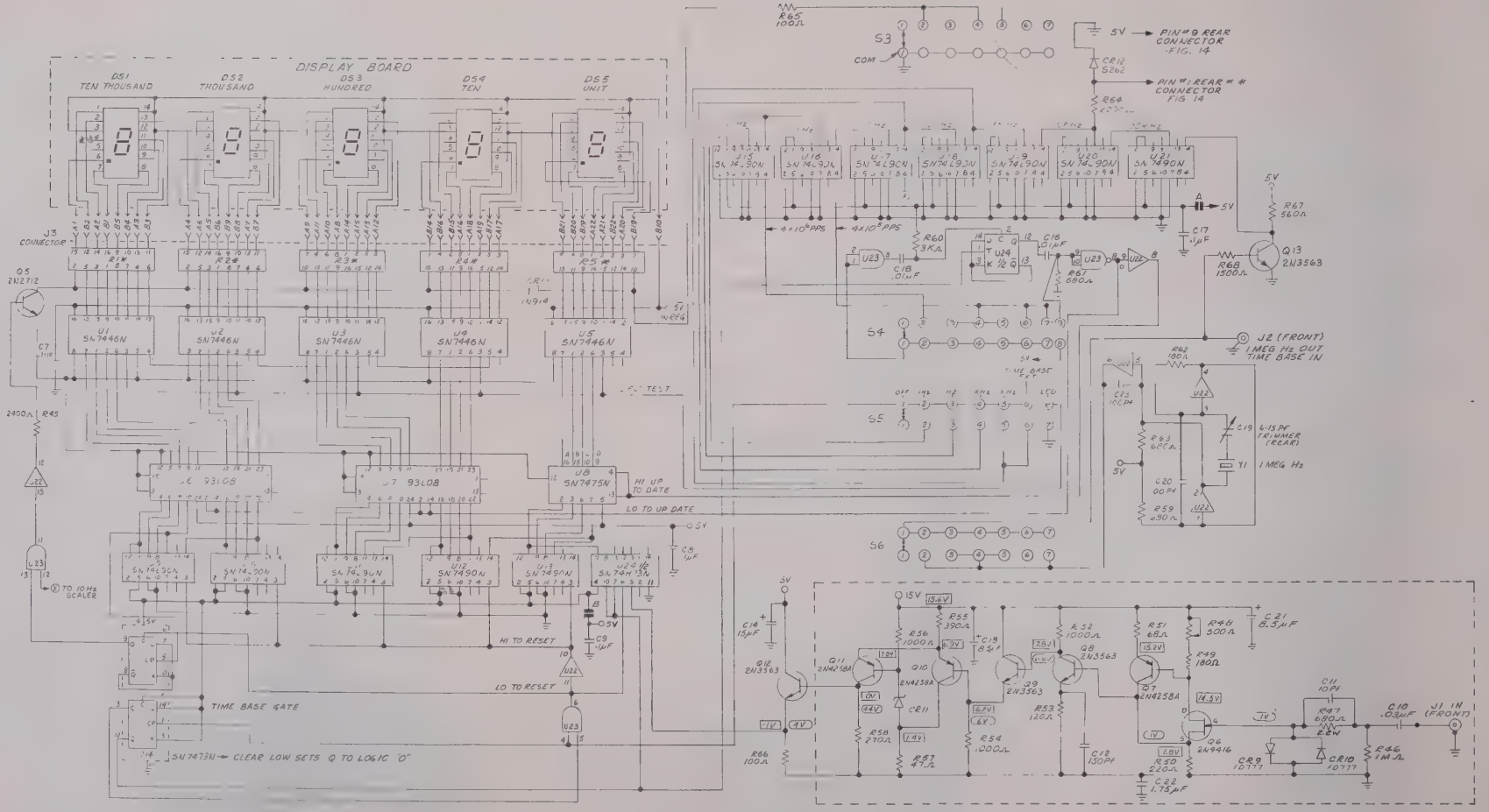

Figure 13. Schematic Diagram

NOTES:
- ▭ - INDICATES "PEAK TO PEAK" AC VOLTAGE, 1MHz CLOCK APPLIED TO INPUT.
- ⬭ - INDICATES DC VOLTAGE MEASUREMENT REFERRED TO AND NO SIGNAL INPUT SENSITIVITY ADJUSTED 10MHz RANGE.

U22-SN7404N, U23-SN7400N, U24-SN74H73N, U22 & U23 Vcc PIN 14, GND PIN 7.
* - INDICATES R1 - R5 RESISTOR MODULE, EIGHT (8) 240Ω, 1/4W ± 10% RESISTORS PER MODULE.
SQUARE PADS —■■— (2) UNSOLDERED FOR Vcc (5V) ISOLATION TEST POINTS.

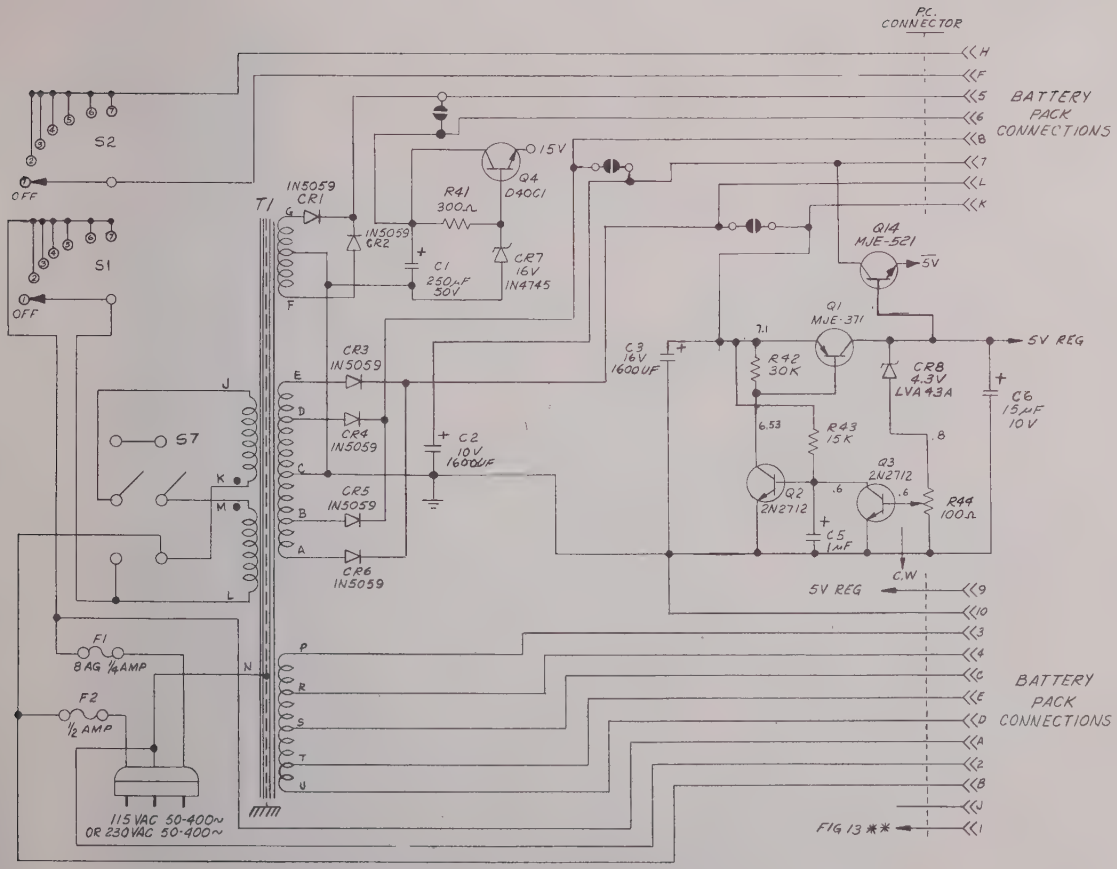

Figure 14. Power Supply Schematic Diagram

PARTS LIST

ITEM NO.	DESCRIPTION	WESTON PART NO.
	ASSEMBLY (Ref Figure 11)	
1	FRONT	272019-901
2	WINDOW	272016-901
3	JACK (J1,J2)	272173-901
4	SOCKET	267330-077
5	SPRING, DETENT	267333-001
6	ROLLER, DETENT	267334-001
7	KNOB	267331-901
8	DIAL	272017-901
9	LEAD, GROUND INTERCONNECT	272082-901
10	BOARD ASSY	271907-901
10	BOARD ASSY (For 230V Meter)	271907-902
11	SHAFT, RANGE SWITCH	269436-001
12	CASE	272018-901
13	SPRING	270006-172
14	CONTACT	269062-001
15	FUSE, 1/4A, 8AG (F1)	29787-001
16	PIN, AC FUSE	269066-001
17	SCREW	266623-045
18	CLAMP	265661-024
19	GUARD	267351-001
20	SCREW	32910-024
21	HANDLE, FRONT	267345-366
22	HANDLE, REAR	267346-366
23	GRIP, HANDLE	267347-902
24	KNOB, HANDLE	269546-001
25	KNOB, HANDLE	269547-001
26	LEAD, BNC CABLE, AL-C-BNC-36 (Not shown)	272740-001
27	LINE CORD (Standard) (Not shown)	269985-001
27	LINE CORD (For 230V Meter) (Not shown)	271759-001

ITEM NO.	DESCRIPTION	WESTON PART NO.
	ASSEMBLY (Ref Figure 11)	
28	TUBE, CLAMP (Not shown)	269437-001
29	ACCESSORY KIT (Standard) (Consists of items 20 thru 28)	273001-901
29	ACCESSORY KIT (For 230V Meter) (Consists of items 20 thru 28)	273001-902
32	COVER, PROTECTIVE, REAR (For 230V Meter)	270978-001

REF SYMBOL	DESCRIPTION	WESTON PART NO.
	BOARD ASSEMBLY (Ref Figures 12, 13, & 14	
C1	CAPACITOR, 250μF, +50% −10%, 50WVDC	266349-001
C2	CAPACITOR, 1600μF, +50% −10%, 10WVDC	266607-001
C3	CAPACITOR, 1600μF, +50% −10%, 10WVDC	266607-001
C5	CAPACITOR, 1μF, ± 20%, 35WVDC	270163-001
C6	CAPACITOR, 15μF, ± 20%, 10WVDC	269951-001
C7	CAPACITOR, 0.1μF, +80% −20%, 10WVDC	272376-001
C8	CAPACITOR, 0.1μF, +80% −20%, 10WVDC	272376-001
C9	CAPACITOR, 0.1μF, +80% −20%, 10WVDC	272376-001
C10	CAPACITOR, 0.022μF, ± 20%, 250WVDC	272241-001
C11	CAPACITOR, 10pF, ±10%, 500WVDC	270013-001
C12	CAPACITOR, 150pF, ± 5%, 500WVDC	265869-001
C13	CAPACITOR, 8.2μF, ± 20%, 15WVDC	269952-001
C14	CAPACITOR, 15μF, ± 20%, 10WVDC	269951-001
C16	CAPACITOR, 0.01μF, +80% −20%, 50WVDC	269899-001
C17	CAPACITOR, 0.1μF, +80% −20%, 10WVDC	272376-001
C18	CAPACITOR, 0.01μF, +80% −20%, 50WVDC	269899-001
C19	CAPACITOR, VARIABLE, 10–60pF, 250WVDC	270081-001
C20	CAPACITOR, 100pF, ± 5%, 500WVDC	266325-001
C21	CAPACITOR, 8.2μF, ± 20%, 15WVDC	269952-001
C22	CAPACITOR, 1.75μF, ± 10%, 100WVDC	269897-001
C23	CAPACITOR, 100pF, ± 5%, 500WVDC	266325-001

REF SYMBOL	DESCRIPTION	WESTON PART NO.
	BOARD ASSEMBLY (cont.)	
CR1	DIODE, 1N5059	266611-001
CR2	DIODE, 1N5059	266611-001
CR3	DIODE, 1N5059	266611-001
CR4	DIODE, 1N5059	266611-001
CR5	DIODE, 1N5059	266611-001
CR6	DIODE, 1N5059	266611-001
CR7	DIODE, ZENER, 1N4745	270152-001
CR8	DIODE, ZENER, LVA-43A	272737-001
CR9	DIODE, FD777	272731-001
CR10	DIODE, FD777	272731-001
CR11	DIODE, ZENER, MZ-500-10	272736-001
CR12	DIODE, S262	263643-001
CR13	DIODE, 1N914	ND61025-001
DS1	DISPLAY, NUMERIC, LED	271955-001
DS2	DISPLAY, NUMERIC, LED	271955-001
DS3	DISPLAY, NUMERIC, LED	271955-001
DS4	DISPLAY, NUMERIC LED	271955-001
DS5	DISPLAY, NUMERIC, LED	271955-001
E1	HEATSINK	272015-167
E2	HEATSINK	272094-001
F2	FUSE, 1/2A, Littlefuse 276,500	272753-001
J3	CONNECTOR, Viking 3KH22/21JV12	272739-001
Q1	TRANSISTOR, MJE371	266343-001
Q2	TRANSISTOR, 2N2712	ND39917-001
Q3	TRANSISTOR, 2N2712	ND39917-001
Q4	TRANSISTOR, D40C1	268797-001
Q5	TRANSISTOR, 2N2712	ND39917-001
Q6	TRANSISTOR, 2N4416	272721-001

REF SYMBOL	DESCRIPTION	WESTON PART NO.
	BOARD ASSEMBLY (cont.)	
Q7	TRANSISTOR, 2N4258A	272722-001
Q8	TRANSISTOR, 2N3563	272723-001
Q9	TRANSISTOR, 2N3563	272723-001
Q10	TRANSISTOR, 2N4258A	272722-001
Q11	TRANSISTOR, 2N4258A	272722-001
Q12	TRANSISTOR, 2N3563	272723-001
Q13	TRANSISTOR, 2N3563	272723-001
Q14	TRANSISTOR, MJE521	264607-001
R1 Thru R5	RESISTOR, MODULE, 240 ohms, 1/4 watt (8 RESISTORS PER MODULE)	272735-001
R41	RESISTOR, 300 ohms, ± 5%, 1/4 watt	270165-001
R42	RESISTOR, 30K ohms, ± 5%, 1/4 watt	269908-001
R43	RESISTOR, 15K ohms ± 5%, 1/4 watt	263655-001
R44	RESISTOR, VARIABLE, 100 ohms, ± 20%	272734-001
R45	RESISTOR, 2400 ohms, ± 5%, 1/4 watt	266615-001
R46	RESISTOR, 1 Megohm, ± 5%, 1/4 watt	268782-001
R47	RESISTOR, BERYLLIUM OXIDE CORE, 680 ohms	272783-001
R48	RESISTOR, VARIABLE, 500 ohms, ± 10%	272732-001
R49	RESISTOR, 180 ohms, ± 10%, 1/4 watt	ND20593-001
R50	RESISTOR, 220 ohms, ± 5%, 1/4 watt.	272720-001
R51	RESISTOR, 68 ohms, ± 5%, 1/4 watt	272719-001
R52	RESISTOR, 1K ohms, ± 5%, 1/4 watt	266612-001
R53	RESISTOR, 120 ohms, ± 5%, 1/4 watt	272718-001
R54	RESISTOR, 1K ohms, ± 5%, 1/4 watt	266612-001
R55	RESISTOR, 390 ohms, ± 5%, 1/4 watt	272246-001
R56	RESISTOR, 1K ohms ± 5%, 1/4 watt	266612-001
R57	RESISTOR, 47 ohms, ± 5%, 1/4 watt	272716-001
R58	RESISTOR, 270 ohms, ± 5%, 1/4 watt	272717-001
R59	RESISTOR, 680 ohms, ± 5%, 1/4 watt	266321-001
R60	RESISTOR, 3K ohms, ± 5%, 1/4 watt	269857-001

REF SYMBOL	DESCRIPTION	WESTON PART NO.
	BOARD ASSEMBLY (cont.)	
R61	RESISTOR, 680 ohms, ± 5%, 1/4 watt	266321-001
R62	RESISTOR, 180 ohms, ± 10%, 1/4 watt	ND20593-001
R63	RESISTOR, 680 ohms, ± 5%, 1/4 watt	266321-001
R64	RESISTOR, 10K ohms, ± 5%, 1/4 watt	264673-001
R65	RESISTOR, 100 ohms, ± 5%, 1/4 watt	ND37340-001
R66	RESISTOR, 100 ohms, ± 5%, 1/4 watt	ND37340-001
R67	RESISTOR, 560 ohms, ± 5%, 1/4 watt	269910-001
R68	RESISTOR, 1.5K ohms, ± 5%, 1/4 watt	264677-001
S1 Thru S6	SWITCH ASSEMBLY	272014-901
S7	SWITCH, SLIDE, DPDT	269957-001
S7	SWITCH, SLIDE, DPDT (For 230V Meter)	272371-001
T1	TRANSFORMER	271988-901
TB1	BOARD, DRILLED	271906-901
U1	MICROCIRCUIT, SN7446N	272729-001
U2	MICROCIRCUIT, SN7446N	272729-001
U3	MICROCIRCUIT, SN7446N	272729-001
U4	MICROCIRCUIT, SN7446N	272729-001
U5	MICROCIRCUIT, SN7446N	272729-001
U6	MICROCIRCUIT, 93L08	272730-001
U7	MICROCIRCUIT, 93L08	272730-001
U8	MICROCIRCUIT, SN7475N	272728-001
U9	MICROCIRCUIT, SN74L90N	272727-001
U10	MICROCIRCUIT, SN74L90N	272727-001
U11	MICROCIRCUIT, SN74L90N	272727-001
U12	MICROCIRCUIT, SN7490N	272267-001

REF SYMBOL	DESCRIPTION	WESTON PART NO.
	BOARD ASSEMBLY (cont.)	
U13	MICROCIRCUIT, SN7490N	272267-001
U14	MICROCIRCUIT, SN7473N	272265-001
U15	MICROCIRCUIT, SN74L90N	272727-001
U16	MICROCIRCUIT, SN74L90N	272727-001
U17	MICROCIRCUIT, SN74L90N	272727-001
U18	MICROCIRCUIT, SN74L90N	272727-001
U19	MICROCIRCUIT, SN74L90N	272727-001
U20	MICROCIRCUIT, SN74L90N	272727-001
U21	MICROCIRCUIT, SN7490N	272267-001
U22	MICROCIRCUIT, SN7404N	272759-001
U23	MICROCIRCUIT, SN7400N	272264-001
U24	MICROCIRCUIT, SN74H73N	272724-001
X1	SOCKET, MOLEX 1850-A4	269944-001
X2	SOCKET, MOLEX 1850-A4	269944-001
X3	SOCKET, MOLEX 1850-A3	269945-001
Y1	CRYSTAL, 1MHz	271954-001

WESTON EQUIPMENT WARRANTY

Weston warrants equipment of its manufacture against defective materials or workmanship for a period of one year from date of shipment.

The liability of Seller under this warranty is limited, at Seller's option, solely to repair, replacement with equivalent Weston equipment, at an appropriate credit adjustment not to exceed the original equipment sales price, of equipment returned to the Seller provided that (a) Seller is promptly notified in writing by Buyer upon discovery of defects, (b) Upon receipt of written authorization from Seller the defective equipment is returned as directed, transportation charges prepaid by Buyer, and, (c) Seller's examination of such equipment discloses to his satisfaction that defects were not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration by the Buyer.

This warranty does not include mechanical parts failing from normal useage nor does it cover limited life electrical components which deteriorate with age such as tubes, lamps, etc.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of fitness for a particular purpose to the original purchaser or to any other person. Seller shall not be liable for consequential damages of any kind.

The aforementioned provisions do not extend the original warranty period of any article which has been either repaired or replaced by Seller.

NOTES

NOTES

MP MASTER
MA35432